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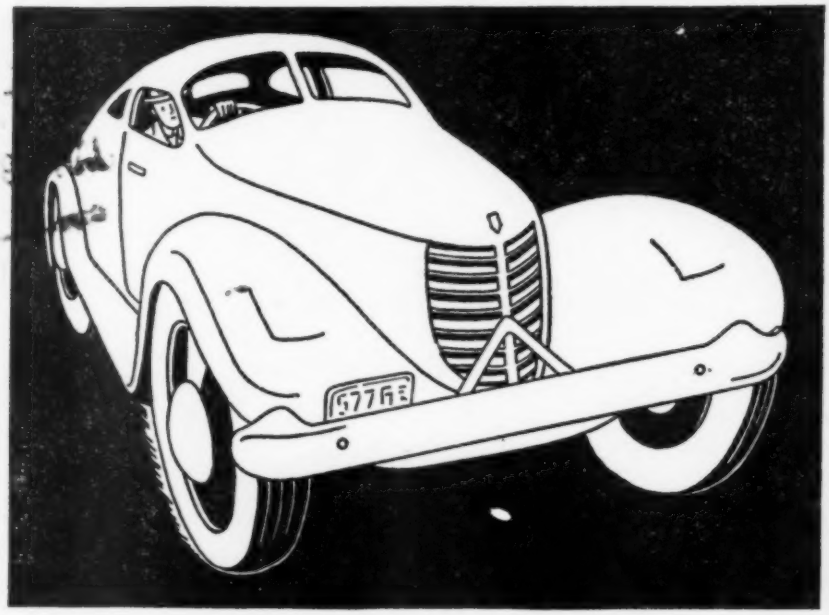

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VOL. 22 — No. 1

CONTENTS

Page

TITLE PAGE 1

FRONTISPIECE
J. Fred Andreae 2

ORIGINAL PAPERS
Notes on Industrial Injuries. Max D. Kossoris 3

Scintillating Scotoma. A. Barnett 14

Color designation for lights. Kenneth L. Kelly 16

EDITORIALS 24

TRANSACTIONS OF THE ACADEMY 28

PROCEDURE AND INSTRUMENTATION by R. H. Ehrenberg 32

SPECIAL REPORTS 36

BOOK NOTICES 40

ANNOUNCEMENTS 41

ABSTRACTS ..... 43 to 50

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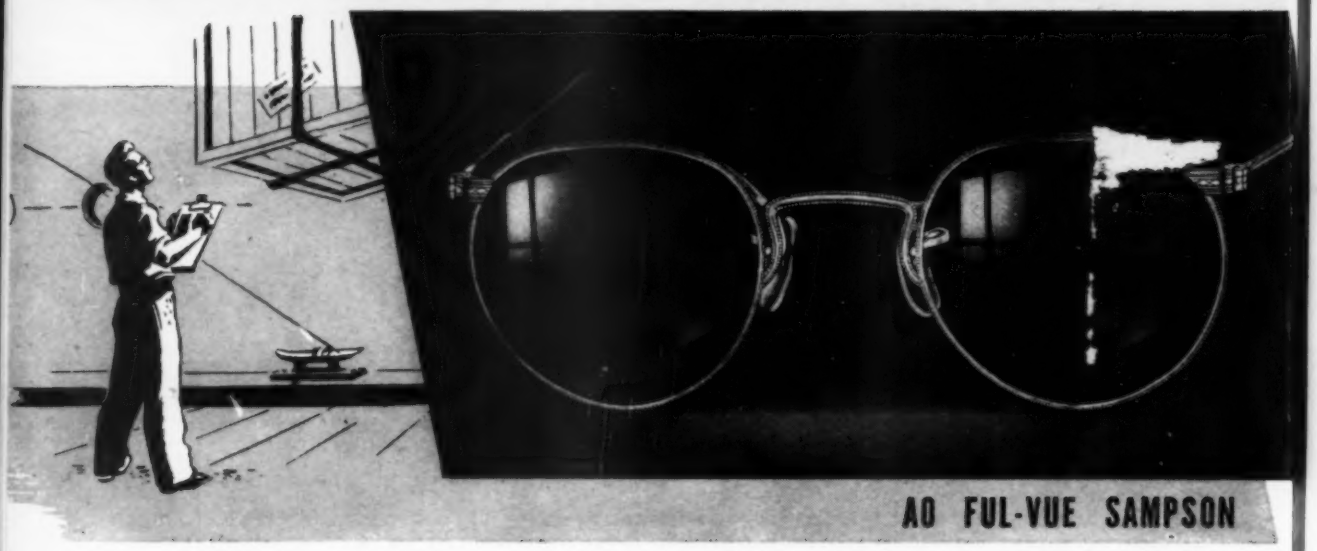

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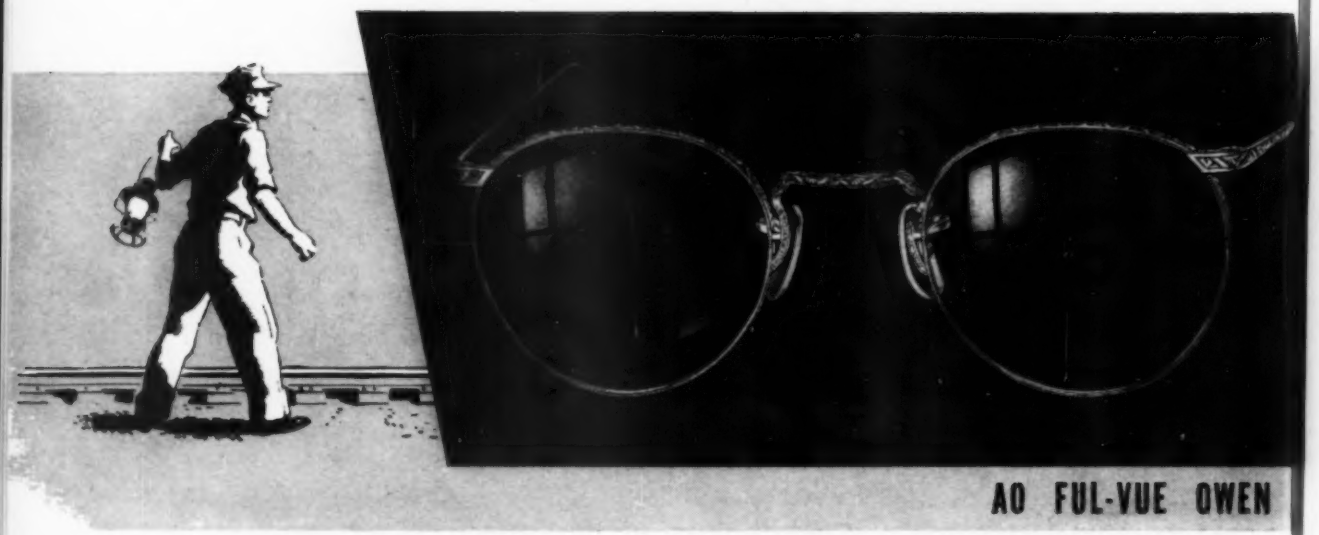

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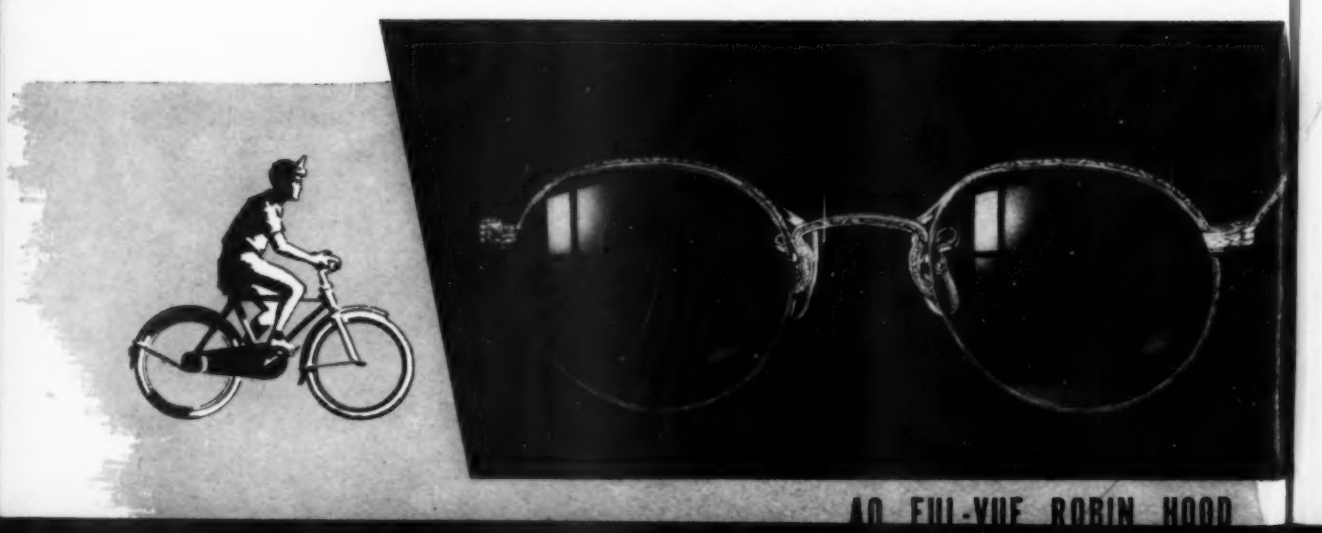

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The President Elect

1945

J. Fred Andreae

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NOTES ON INDUSTRIAL INJURIES*

Max D. Kossoris
U. S. Bureau of Labor Statistics

As a general rule, the number of disabling work injuries during 1941 increased much more sharply than did either total employment or the total number of employee-hours worked. Particularly was this true of manufacturing industries. For the 21,422 manufacturing establishments which reported to the Bureau of Labor Statistics for both 1940 and 1941, employment increased by 21 per cent, employee-hours worked by 28 per cent, and disabling injuries by 46 per cent. As a result, the frequency rate, measuring the average number of injuries per million hours worked, was 14 per cent higher in 1941 than in 1940. This increase in the frequency rate is attributable to the influx of large numbers of inexperienced workers into the rapidly expanding war industries, the crowding of workers in the wartime factories, and the failure of safety activities to keep fully abreast of the war program.

Industrial injuries are for the most part preventable, and yet their daily toll is one of the most significant causes of time lost from work in the United States. In 1941, according to estimates of the Bureau of Labor Statistics they resulted in 19,200 deaths, 100,600 permanent impairments, and 2,060,400 temporary disabilities. The workers injured in 1941 lost 42,083,000 days of work in that year. In addition, however, death and permanent disability will result in lost time or in lost effectiveness in future years. This amounts to 209,000,000 days. Similar injuries in earlier years resulted in lost time in 1941 of which there is no direct measure. The best single approximation of total time lost in 1941 because of injuries is therefore the sum of time lost in 1941 for disabilities incurred in that year plus the economic equivalent of permanent disabilities and deaths, a total of 251,000,000 days. This is equivalent to

*Abridged from Industrial Injuries in the United States in 1941. Monthly Labor Review, Vol. 55, No. 3, pp. 501-526. United States Department of Labor. Bureau of Labor Statistics

full-time employment for a year for more than 800,000 workers. These tremendous losses of manpower during a time requiring maximum production for war constitute a challenge to management to undertake more extensive and intensive safety efforts.

The weighted frequency rate for the entire manufacturing group was 18.1 injuries per million employee-hours worked. The 27,749 establishments reported an exposure of 6,122,000 employees with a total of 12,621,321,000 hours worked, and an injury total of 225,900. Of the reported injuries, deaths and permanent total disabilities accounted for about one-half of 1 per cent, permanent partial impairments for about 5½ per cent, and temporary total disabilities for the remainder, or 94 per cent. As would be expected, most of the permanent partial injuries involved fingers or the hand. Injuries to these members accounted for 77 per cent of the total of permanent impairments, impairments of the foot or toes for 7 per cent, enucleation or impairment of vision for 5 per cent, damage to arm or leg 3 per cent each, and miscellaneous body impairments for the remainder. In the first rank, for having the highest percentage of lost or impaired fingers or hands, was the folding-box industry, with 94 per cent, followed closely by the stamped and pressed metal products and the partitions, shelving, and store fixtures industries, each with 93 per cent. The highest percentage of permanent injuries to legs occurred in the fertilizer industry, with 18 per cent; and the logging industry came second, with 15 per cent. Outstanding for high percentages of lost or impaired feet or toes were the fertilizer, petroleum-refining, soap, sugar-refining, logging, and special-industry-machinery industries. Eye impairments ranked relatively high in the ornamental metalwork, logging, pulp, and the brick, tile, and terra cotta manufacturing industries, and streetcar and bus transportation.

Altogether, nearly 52,000 establishments with about 7,500,000 workers were covered in the Bureau's 1941 survey of both manufacturing and nonmanufacturing industries. These employees worked during 1941 about 15,260 million hours, and during that exposure suffered nearly 258,000 disabling injuries. Of these, 1,268 were deaths, 167 permanent total disabilities, 13,297 permanent partial impairments, and 242,958 temporary total disabilities.

Utilizing all available reports so as to have the largest possible exposure in each industry surveyed, the Bureau found that the logging industry in 1941 occupied its usual rank as the industry with the highest frequency rate, or 96.3 injuries per million hours worked. This means

that there was approximately 1 injury for every 5 men employed throughout the year. Considerably lower, but still exceeding the rate of any other manufacturing industry were sawmills, with a rate of 54.5. Other manufacturing industries with frequency rates in excess of 30 were slaughtering and meat packing (30.9), fabricated structural steel (35.7), forgings (44.5), foundries (47.0), steam fittings and apparatus (32.5), planing mills (39.3), wooden containers (44.9), machinery-repair shops (35.8), corrugated boxes (32.7), fiber boxes (33.4), brick, tile, and terra cotta (38.2), concrete, gypsum, and plaster products (46.7), and cut stone and stone products (33.4).

Of particular interest is the experience of establishments manufacturing critical war materials. The explosives industry averaged only 5.7 disabling work injuries per million hours worked. In forgings and foundry establishments these averages were 44.5 and 47.0, respectively. Manufacture of ammunition averaged 32.1; of guns and related equipment, 29.8; shipbuilding, 26.4; manufacture of tanks, 18.3; and the aircraft industry, 10.4.

Continuing the practice, started last year, of providing general estimates of work injuries for individual manufacturing industries, the Bureau made similar estimates for 1941. The iron and steel group in itself was estimated to have had 74,300 disabilities, accounting for 7 million lost man-days. The lumber industries group followed with 66,800 disabling work injuries, but with 7¼ million lost man-days. The machinery group ranked third with 56,600 injuries and 4½ million lost days. The food products group came fourth, with 47,300 injuries and 3 1/3 million days lost. A close fifth in the number of injuries was the textile industry with 45,200 disabilities and a time loss of not quite 3 million days. The transportation-equipment group, sixth in rank, with 37,500 injuries, nevertheless ranked fourth in time lost, with nearly 4½ million days. The stone, clay, and glass products group, with 20,600 injuries, accounted for nearly 2 million days of lost time. These seven groups of manufacturing industries are estimated to have had among them nearly 350,000 disabling injuries, involving 31½ million of lost man-days.

Individual industries having lost time in excess of one million man-days were iron and steel (2,259,000), foundries (1,483,000), general industrial machinery (1,229,000), motor vehicles and parts (1,313,000), shipbuilding, and aircraft manufacture. These six critical war industries alone are estimated to have had 86,600 disabling work in-

juries (of which 520 were fatal) and a total of 8,820,000 days lost.

Comparison of the experiences of 21,422 manufacturing establishments indicates that the frequency of disabling industrial injuries per million hours worked was 14 per cent greater in 1941 than in 1940. For the entire group of identical manufacturing establishments, disabling injuries went up 46 per cent; employment, 21 per cent; and employee-hours worked, 28 per cent. In most individual industries the frequency rate changed upward, and in many the percentage of increase in injuries was two or more times as large as the increase in employment or employee-hours worked. Only 15 industries showed downward trends in frequency rates, whereas in 80 manufacturing industries the trend was upward. The greatest decrease in the frequency rate was that of 59 per cent, in the explosives industry. The aircraft industry experienced a decrease of 20 per cent; rayon and allied products, 16 per cent; coke ovens, 12 per cent; and women's clothing, 11 per cent. All other decreases were less than 10 per cent.

On the other hand, substantial increases in frequency rates were common. In the manufacture of forgings, the rate went up 40 per cent; in foundries, 30 per cent; tinware, 34 per cent; confectionery, 45 per cent; general industrial machinery, 29 per cent; corrugated boxes, 62 per cent; cement, 35 per cent; and nonferrous smelting and refining, 35 per cent.

In the iron and steel, forgings, and foundries industries, the increases in injuries far outstripped the increases in employment and exposure hours (i. e., employee-hours worked). In fact, this was true of practically all of the industries in the iron and steel products group.

In the important shipbuilding, metalworking machinery, and railroad equipment industries the increases in injuries were considerably in excess of the increases recorded in employment and employee-hours worked. Characteristic of this trend, the plants manufacturing rubber tires had an increase of 54 per cent in injuries although employment and employee-hours worked increased only 17 per cent and 26 per cent, respectively. On the contrary, in the aircraft industry the proportionate increase in injuries was substantially less than the rise in either employment or in hours worked.

As a general rule, in both manufacturing and nonmanufacturing industries, the addition of new employees and the working of longer hours resulted in disproportionately larger increases in industrial injuries.

For every million workers employed in manufacturing industries

during 1941, 163 were killed, 25 were permanently and totally disabled from any gainful industrial pursuits, 2,060 suffered a partially crippling injury, and 34,646 were disabled for at least 1 day, and an average of 16 days.

The national experience during 1941 indicates that industrial fatalities rose from 18,100 in 1940 to 19,200 in 1941, an increase of 6 per cent. Permanent partial disabilities are estimated to have increased from 89,600 to 100,600, or about 12 per cent. Temporary total disabilities, however, rose from 1,782,000 in 1940 to 2,060,400 in 1941, or 16 per cent. The fatality figures, as in the past, include a small number of permanent total disabilities.

The construction-industry group was estimated to have had the largest number of injuries, 495,500. Manufacturing was a close second with 452,700 injuries, an increase of about 43 per cent over the 1940 estimate of 316,000. In the number of fatalities, agriculture led with 4,500, and construction ranked second with 4,100. Manufacturing, which had 1,900 fatalities in 1940, had 2,400 in 1941. Another sharp increase in both injuries and fatalities occurred in the railroad industry, where the number of injuries rose from 33,700 to 48,200, and fatalities from 700 to 1,100, increases of 43 and 57 per cent, respectively.

Deviating from the practice followed in the past of presenting injury rates only for identical establishments reporting for the year surveyed and the one preceding it, the rates for 1941 are based on the entire reporting group.

The manufacturing group averaged 18.1 disabling injuries per million employee-hours. This was a weighted frequency rate, with the experience of each industry weighted in the composite total on the basis of employment. Similarly, for each 1,000 hours worked, 1.7 days were lost because of injuries. Putting the two rates on a strictly comparable basis, for every million employee-hours worked 18.1 workers were disabled and 1,700 days were lost, or an average of 94 days per injured worker. This average, however, includes not only days of disability, but the time charges for deaths, permanent total disabilities, and for impaired arms, hands, fingers, legs, feet, toes, or eyes as well, in the case of permanent partial disabilities.

Manufacturing industries with outstandingly high frequency rates have already been cited. At the other end of the scale are a number of industries with very low frequency rates: Explosives, 5.7; boots and shoes, 7.6; news and periodical printing and publishing, 7.6; bookbind-

ing, 6.5; cement, 7.4; men's and women's clothing, 6.7 and 3.6, respectively; knit goods, 6.5; tobacco products, 6.2; radios and phonographs, also 6.2; and coke ovens, 4.3.

Among the nonmanufacturing industries, construction had the highest frequency rate. The rate of 47.5 for the group is a weighted rate. Heavy engineering establishments had the highest frequency rate, 68.0. Highway construction followed, with a rate of 55.9, and building construction had the lowest rate, 41.8.

The telephone industry had a frequency rate of only 2.7. No adequate data are available for the large industry of communication by telegraph, in which injuries to messengers present an important accident hazard.

The rate of 26.8 for the transportation group (exclusive of railroad and boat transportation) is again a weighted rate, taking into account the uneven representation of the individual component industries. The integrated operation of both streetcars and buses, for some unknown reason, has a lower frequency rate (11.6) than either streetcar (15.5) or bus transportation (13.3) alone. Warehousing and storage had by far the highest rate, with an average of 51.9 injuries per million hours, and trucking and hauling followed with a rate of 34.8.

In the heat, light, and power group, the frequency rate of 14.3 for the gas industry exceeded that for the electric light and power utility (11.1). Waterworks, however, exceeded both, with a rate of 19.9.

None of the frequency rates for the industries shown in the personal and business services group were very high. The highest rate (15.6) in the first group was experienced by hotels and eating and drinking places. The highest rate in the second group (13.8) was for real estate establishments. It is interesting to note, however, that the real estate business appears to be nearly as hazardous to employees as the operation of hotels, restaurants, and similar establishments.

Another interesting point, often overlooked, is that work in educational institutions is quite hazardous to employees; more so, for instance, than the operation of streetcars and buses. The respective frequency rates for these three types of industries were 16.4, 15.5, and 13.3.

In the trade group, the combination activity of wholesale and retail had a higher frequency rate (19.0) than either of the two individually, with 17.8 for wholesale, and rates varying from 4.3 for ap-

parel and accessory stores to 16.5 for automobile retail and 16.0 for food stores. Filling stations experienced a frequency rate of 15.6.

As a general rule, the number of disabling injuries during 1941 increased much more than did the exposure of employees, whether measured in terms of employment or of employee-hours worked. The industries in which disabling injuries decreased while the exposure increased, or in which disabling injuries increased by a smaller percentage than did exposure, are very few.

In 21,422 identical manufacturing establishments reporting for both 1941 and 1940, employment increased 21 per cent, total employee-hours worked 28 per cent, and the number of disabling injuries 46 per cent. As a result, the weighted frequency rate went up 14 per cent over that for 1940. The relationship of an increase in injuries about twice as large as the increase in employment was found in many of the industries of the manufacturing group.

In decided contrast with its 1940 experience, the explosives industry showed a pronounced decrease in injuries although both employment and employee-hours worked rose substantially. In 1940, increases of 29 per cent in employment and 32 per cent in total hours worked were coupled with an increase of 297 per cent in injuries. As a consequence of this sharp reversal, the frequency rate for 1941 was 59 per cent lower than the corresponding rate for 1940.

Petroleum refining establishments experienced a slight reduction, 2 per cent, in the frequency rate, with injuries increasing 7 per cent against an increase of 8 per cent in exposure hours and of 4 per cent in employment. In iron and steel production, however, injuries increased 39 per cent, with increases in employment and exposure hours of 23 and 25 per cent. In forgings, the injury increase was still more marked, going up 119 per cent, against increases of 56 per cent in hours and 40 per cent in employment. In foundries, the injury increase was about twice that in employment or exposure hours. The same was true in an even larger measure in the leather and boots and shoes industries, and again in planing mills.

In the machinery group, the establishments producing metalworking machinery and those producing electrical equipment experienced proportionate rises in injuries much greater than their corresponding rises in employment and hours worked. In the manufacture of rubber tires, injuries increased twice as rapidly as exposure hours, and three times as rapidly as employment. In shipbuilding injuries the relative rise was

over 50 per cent greater than the rise in employment and 37 per cent greater than the rise in exposure hours. In the production of aircraft, however, this general trend was reversed, with the increase in injuries somewhat below the increase in employment, and considerably below that in exposure hours. But in the production of motor vehicles and railroad equipment, the general trend again is evident.

In the nonmanufacturing industries, the accident-frequency rate of the construction group as a whole showed a slight downward change —6 per cent. This change was due largely to the experience of highway construction, in which a decrease of 11 per cent in employment and 4 per cent in exposure hours resulted in a 25 per cent reduction in injuries. In building construction the increase in injuries was about the same as the change in employment (32 and 33 per cent), but was below the increase of 43 per cent in hours. On the other hand, on heavy engineering projects, the increase in injuries, 46 per cent, considerably exceeded those in employment and exposure hours, 21 and 32 per cent, respectively.

A comment is in order concerning the changes in the frequency rates of the personal services, business services, and trade groups. In each instance, the change in the frequency rate for the entire group appears to be out of line with the changes shown in exposure and injuries. Thus, the 2,558 personal-service establishments covered in the survey had an increase of 32 per cent in the composite frequency rate, with an increase in injuries of only 11 per cent and increases of 15 and 16 per cent in employment and exposure hours. The reason for this apparent discrepancy is that the frequency rate change was computed from weighted rates, in which the experiences of individual industries composing the group were weighted on the basis of employment.

The same was true for business services, in which the frequency rate is shown as falling 1 per cent, whereas for the 909 reporting establishments, injuries increased 16 per cent, and employment and exposure hours went up only 2 and 3 per cent, respectively. In the trade group, a 1 per cent drop in the weighted frequency rate was coupled with an increase of 2 per cent in employment, of 3 per cent in exposure hours, and of 4 per cent in disabling injuries. In both of these groups, the weighting (according to employment) of individual industries with dissimilar experiences permits a more adequate measure of the change in the frequency rate for the composite group.

Where the number of reporting manufacturing establishments and their employees in any one industry was sufficiently large to warrant the

assumption that their injury experience fairly adequately reflected that of the entire industry, estimates were made for the injury experience of the industry. With a few exceptions—in which the number of employees reported was in itself large—the sample used represented at least 40 per cent of the total employment in the industry. There is good reason to believe, however, that these estimates are conservative.

The distribution of 12,612 injuries reported for 1941 in the manufacturing industries was exactly the same as that for 8,509 similar injuries reported for 1940, indicating that the general distribution of permanent impairments to body parts remains fairly stable for the entire working population. There were, however, differences for individual industries. For example, in 1941 about 62 per cent of all impairments in the explosives industry were to hands or fingers, as compared with only 25 in 1940. In the fertilizer industry, impairments to legs were 18 per cent in 1941, against 10 in 1940. In sugar refining, there were only 15 foot or toe impairments in 1941 against 22 in 1940, and eye injuries were only 4 per cent as compared with 14 the year before. Hand or finger impairments, however, were 62 per cent of the total, instead of 48 per cent.

Because the severity rate measures the days lost per 1,000 hours' exposure (i. e., employee-hours worked), a study was prepared to show the relative distribution of deaths, permanent impairments, and temporary total disabilities. For permanent partial disabilities the average time charge per injury is shown, as is the average duration per temporary total disability. The time charge per death or permanent total disability is 6,000 days.

For the entire group of manufacturing industries, 0.5 per cent of all injuries resulted in death, 5.7 per cent in permanent partial impairments with an average time charge of 950 days, and 93.8 per cent in temporary total disabilities lasting an average of 16 days each. In only a few industries did deaths exceed 1.0 per cent: Explosives, 2.7 per cent; fertilizer, 1.5 per cent; petroleum refining, 2.3 per cent; iron and steel, 1.5 per cent; ornamental metalwork, 1.1 per cent; logging, 1.5 per cent; cement, 3.6 per cent; pottery, 1.0 per cent; and cut stone and cut-stone products, 1.9 per cent. Among the nonmanufacturing industries, the percentage of fatalities was highest in heavy engineering, 2.1 per cent. In the electric light and power utility, 1.8 per cent of all disabling injuries resulted in death, and in the gas utility, 1.1 per cent. The fatality per-

centage for filling stations was 1.3 per cent, and for trucking and hauling, 1.1 per cent.

Manufacturing industries with 10.0 per cent or more of permanent partial impairments—the general average being 5.7 per cent—were: Explosives, 10.9; soap, 11.3; hardware, 10.2; stamped and pressed-metal products, 10.8; tinware, 10.6; partitions, shelving, and store fixtures, 11.9; cement, 12.7; railroad equipment, 10.9; radios and phonographs, 13.3; and ammunition (except for small arms), 11.5. Coupled with these high percentages were high average time charges per injury in industries manufacturing explosives (1,275 days), cement (1,275 days), and radios and phonographs (1,571 days).

Some of the manufacturing industries in which minor injuries predominated—as indicated by a high percentage of temporary total disabilities of short average durations—were those engaged in the production of cutlery and edge tools, boots and shoes, folding boxes, and tobacco products. Industries in which the average duration of this type of disability exceeded the average considerably are coke ovens, 36 days; cement, 34 days; iron and steel, 27 days; pulp and railroad equipment, 23 days each; rubber tires and petroleum refining, 22 days each; and explosives and logging, each with an average of 21 days.

Among the nonmanufacturing industries, laundries had the highest percentage of permanent partial impairments, with 6.1 per cent. Bus operations averaged 4.4 per cent; dry cleaning, 4.0 per cent; and heavy engineering, 3.7 per cent. The average time charges for these industries varied widely, from 300 each in warehousing and storage and real estate to 2,022 in dry cleaning, and 1,756 in the combined operation of streetcars and buses.

Hotels, and eating and drinking places had the highest percentage of temporary total disabilities, 98.9 per cent, and a low average duration for such injuries of 12 days. Other nonmanufacturing industries with low average durations of temporary total disabilities were insurance, 10 days; retail of apparel and accessories, 11 days; warehousing and storage and pipe lines, each with 11 days; and filling stations, with 13 days.

On the basis of the experience of 21,422 identical manufacturing establishments reporting for both 1940 and 1941, the upward trend of injuries, which started in 1939, continued through 1941. The index for that year was 85.8, against the 1940 index of 75.3, an increase of nearly 14 per cent in the number of injuries per million employee-hours

worked. The increase was general for all types of disability. Death and permanent total disabilities increased from an index of 71.4 for 1940 to 80.3 for 1941, permanent partial impairments from 84.8 to 93.7, and temporary total disabilities from 75.6 to 86.3. The percentage of increase was sharpest in this last group, 14.2 per cent.

SCINTILLATING SCOTOMA*

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Scintillating scotoma is a problem frequently associated with migraine or vertigo. Although it is stated in some textbooks as being very common (*Fuch/Duane*), I have not seen personally many typical cases of this defect. The one of which I am about to give the history and correction is so in accordance with the academic description as to warrant publication.

Mrs. A. F., age 27, stated she had been under medical attention for headaches which had not responded to treatment, and it was suggested ultimately that she should have her eyes examined to ascertain if they were the cause. She did not think they could be, because her vision was good. However, she soon qualified her remarks by stating that sometimes she did see a large dark spot in front of her eyes in which there were sparks of light. The spot grew larger, almost blacking out vision excepting for a few glitters that quickly disappeared. Then followed violent headache during which things about her seemed to move around, also there was dizziness.

The whole history was related without direct questioning, but she was asked to amplify by means of indirect questions.

Here was a clinical history, the substance of which presented a picture such as the text-books give of scintillating scotoma.

The routine examination of cornea, pupils, and fundus revealed nothing abnormal.

Vision: R.E. unaided 6/6, with +0.25 sph. V.A. 6/6
L.E. unaided 6/6, with +0.50 sph. V.A. 6/6

There was nothing subnormal in the duction and phoria tests. R. and L. amplitudes were slightly deficient with each eye with 7 D., the binocular amplitude was the average for the age—8 D.

The visual disturbances here described are frequently associated with migraine, and it has been stated that the center of disturbance is the central nervous system, and the transient nature of the symptoms of scintillation is due to faulty circulation. The precise pathology, to a very great extent, is unknown.

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* An abridgment of the material, "A Case of Scotoma Scintillans," presented in the Optician, (London), Vol. 107, p. 19, 1944.

Some of the symptoms described are very similar to those experienced by certain subjects when standing at great heights without a near protection. The probable cause here is the loss of a near object upon which to exert a slight effort of convergence, therefore the sense of security is lost through the lack of tension of the internal recti. Marton, citing Stutterheim, writes: "Methodical calling upon the power of convergence is bound to bring some change in the vasomotor condition of the brain area involved." The remedy suggested is base-out prisms.

The sensations produced may be caused by an equilibrium defect, in which instance the sixth nerve, whose nucleus is associated with the nucleus of the vestibular nerve, is relieved slightly of supplying nervous energy to the external muscle of the eye.

In this particular instance, and in some similar ones, there was nothing to indicate overaction of the ciliary muscle, neither was there any correctable astigmatism.

Prisms base-out, being indicated by the various signs and symptoms I have described, were tried with the accepted spherical correction in varying degrees in pairs from 1△ to 3△. A pair of 1△ gave the most complete feeling of comfort, or as the patient expressed it: "Seemed softest to the eyes."

The prescription given was:

R.E. +0.25 sph. ⌒ 1△ prism base-out.

L.E. +0.50 sph. ⌒ 1△ prism base-out.

Mrs. A. F. reported after wearing the spectacles for eight weeks that all unpleasant symptoms had been relieved.

COLOR DESIGNATION FOR LIGHTS*

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The development of the Inter-Society Color Council—National Bureau of Standards system of color names for the description of the colors of drugs and medicines (1), (2)[2] suggested to the author the possibility of adapting the same system of names to the description of colors of other than drugs and medicines. In this paper the possibility of applying this system to the colors of self-luminous sources is explored in the hope of offering a basis for the resolution of the conflicting terminology now used for flares, fluorescent and phosphorescent materials, and signal lights. This system could not displace precise specifications in terms of either chromaticity coordinates or standard filters such as are used for railway signal lights (3), but it is expected to provide color names recognized by the general public as appropriate. The spacing of the color-name boundaries is based on that of the ISCC-NBS system (1), but the shape of the boundaries is based on the extensive data collected by the O.S.A. subcommittee (4) on the spacing of the Munsell colors. Both spacing and shape have been modified in accordance with observations by two observers.

The suggested system of color names is composed of 19 hue names and three names indicating reddish hues of reduced saturation (orange pink, pink, and purplish pink). There are, however, no modifiers used to designate whether a light is bright or dim or strong, analogous to what is done for surface colors, because it is intended that the names shall apply to a fairly wide range of intensities and retinal adaptive conditions (5). The changing of the intensity of the source in a source-filter combination will in some instances change the hue (the Bezold-Brücke (6) phenomenon) of the perceived color sufficiently to require the application of another color name while in others the modified hue will remain in the same color-name segment. The boundaries adopted are intended to define chromaticities to which the names apply under the most common conditions of use.

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*An abridgment of the material appearing in the Journal of the Optical Society of America. Vol. 33, No. 11, pp. 627-632, 1943.

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[2] Figures in parentheses indicate the literature references at the end of this paper.

The designations included in this system are: red, reddish orange, orange, yellowish orange, yellow, greenish yellow, yellow-green, yellowish green, green, bluish green, blue-green, greenish blue, blue, purplish blue, bluish purple, purple, reddish purple, red-purple, purplish red, purplish pink, pink, and orange pink. These are all names used in the ISCC-NBS system for light colors of surfaces. The hue names (such as brown or olive) used for dark colors of surfaces are not appropriate for self-luminous sources.

The ISCC-NBS hue-name boundaries are specified in terms of the standards in the *Munsell Book of Color* (7), and it was therefore decided to base the hue-name boundaries of the proposed system on a study of the high-chroma Munsell samples in an attempt to make each of the proposed hue-name ranges include the same range of hue as for the surface color names. It was soon found that even the strongest Munsell samples would not extend these boundaries far into the region on the ICI diagram representing the lights to be designated. Recourse was then had to the constant-hue loci given in the final report (4) of the O.S.A. subcommittee on the spacing of the Munsell colors based on the data contained in the recent paper by Kelly, Gibson, and Nickerson (8). These curves are based on the Munsell standards and are extrapolated out to the spectrum locus by smooth curves. The minimum and maximum saturation boundaries of the pinks were also determined with the aid of the Munsell standards.

The locations of the several hue-name boundaries on the ICI chromaticity diagram were checked by two independent series of observations. The first check consisted of observing a series of light filters available at the National Bureau of Standards in connection with the specification of various signal colors. The colorimetric specifications of these filters were known in combination with a source at 2842°K. From these specifications the designation was found for each source-filter combination, and the observer judged whether the designation was appropriate to the light transmitted by the filter illuminated by a source at approximately this color temperature. Boundaries in the blue and purple region, some in the red, and several elsewhere were adjusted to accord with thse judgments. Light filters were not, however, available for all portions of the diagram and certain of the boundaries remained unchecked by this method.

The colorimetric specifications of the Lovibond glasses (9) for a source of color-temperature 2842°K are being computed at the Bureau

and the specifications of sufficient combinations of these glass filters have been completed to yield a preliminary network indicating approximately the chromaticities of these glasses and their combinations on the ICI chromaticity diagram. From this network it is now possible to determine with sufficient accuracy which glass or set of glasses will, in combination with a source at 2842°K, give a colored light whose colorimetric specification will plot at a specified point on the hue-name diagram. In the second check, a number of these combinations were viewed in a darkened room and judgments were made by two observers (KLK, DBJ[3]) as to which of the hue names listed above was the most appropriate. In this manner it was possible to check most of the boundaries throughout their length and to obtain sufficient points on the other boundaries so that they could be drawn with fair accuracy. Through the use of the Lovibond glasses it was possible to extend these constant-hue lines far beyond the strongest Munsell samples.[4]

The chromaticity ranges identified by each of the color names for lights are defined by areas on the ICI chromaticity diagram (10). The constant-hue boundaries, if extended, would pass through the point representing ICI standard illuminant C which is approximately in the center of the diagram. Around this point, corresponding to daylight surface colors of low saturation, is a region within which no color names have been assigned in this system. Bounding this region is a line representing the weakest colors which will receive a color name and between this minimum line and the spectrum locus are the areas to which are assigned the color names offered in this paper. The region called orange pink, pink, and purplish pink lies between the central region and the purple, red, and orange segments.

It must be remembered that the determination of the hue-name boundaries, which are constant-hue curves, does not constitute redetermination of the psychologically unitary colors or "Urfarben" described by Dimmick (11), (13), since the boundaries describe the colors which appear to fall equally between two named hues, for example, between red and reddish orange. However, it is possible to estimate from these limits the dominant wave-lengths of the chromaticities of maximum purity corresponding to the unitary hues.

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[4] The points so determined and the lines connecting them have been accepted by the O.S.A. subcommittee and are included in their final report (4).

TABLE I. Dominant wave-lengths corresponding to various hues.

Authority	Date	Red	Reddish orange	Orange	Yellowish orange	Yellow	Greenish yellow	Yellow green	Yellowish green	Green	Bluish green	Blue green	Greenish blue	Blue	Purplish blue	Blue violet	Violet	Bluish purple	Purple	Reddish purple	Red purple	Purplish red
Helmholtz	1866	687(492.4c)	656							527						431						
Bezold	1874		656		589	578		558		532		502		468		432						
Donders	1884					582				535				485								
Rood	1890	700(492.4c)	621	597	588	581				527		502		473		438	406					
Voeste	1902					577				498				476								
v. Kries	1907					574				503												
Westphal	1909					574				506				479								
Dreher	1911					575				509				477								
Ridgway	1912	644(492.1c)		598		577				520				473			410					
Goldytsch	1916													468								
Bradley	1920	656(492.2c)		608		579				514				469			421					
Goldmann	1922					568				504				468								
Priest	1926	680(492.4c)				583				515				475								
Brückner	1927					578				498				471								
Shubert	1928					574				500				467								
Purdy	1931					576				504				476								
Drever	1932		640			568				508				471								
Weld	1932		622		597			577				492				456						
Gage	1933		625		600																	
Ornstein	1934			596		575		562		515		492		475								
Verl :	1935		605	598	587	580		569		530		496										
Terpstra	1935		604	592	585	577		563		510		487		470		440						
Seguy	1936	700(492.4c)		597		581				527				473		438	406					
Dimmick	1939	493.6c				582				515				476								
Averages		492.5c	629	598	591	577		566		514		495		474		439	411					
Proposed system	1943	493c	606	592	583	578	573	565	545	508	495	490	485	476	454			566c	560c	545c	506c	496c

So that this recent determination may be compared to the previous determinations and an average computed, complementary wave-lengths are given in Table I in parentheses following the values of dominant wave-lengths. The averages of the wave-lengths for the unitary hues are equally weighted arithmetical means.

These averages of wave-lengths for the various hues also are compared in Table I with the wave-lengths corresponding to the centers of the proposed hue ranges at the edges of the ICI diagram. It will be noted that the agreement for red, yellow, yellow-green, green, and blue is good, but that for reddish orange, orange, and yellowish orange somewhat inferior. Only four values have been previously reported for violet and none for the purples; so it is impossible to make any comparisons with these data in the purplish blue to red region. From the wave-lengths reported, blue-violet and violet fall between the centers of the suggested purplish blue and bluish purple areas. Except for yellowish orange, the suggested system gives wave-lengths intermediate to those reported by the various authorities for the corresponding hues.

In Table II the chromaticity ranges of these proposed color designations are compared with those defined in the standard specifications for the several marine (14), traffic (15), railroad (3), and aviation (16) signal-light colors. The colors of lights permitted by the specifications are grouped in Table II according to hue, and opposite them in the next column are given the corresponding proposed color designation or designations. It will be noted, for example, that ANC (16) (Army, Navy, Civil Aeronautics Administration) aviation red includes not only chromaticities described here as red, but also some described as reddish orange. This is correct since the orange limit of aviation red is the color of light from a neon discharge tube, which is reddish orange. ANC identification yellow is quite reddish so as to be distinguishable from the color of the incandescent lamp (which is often called "white"). Because of its reddish hue the name orange might be more appropriate than yellow to describe the color of this signal. The color designation "amber" has sometimes been used for yellow signal colors. The railroad, marine, and traffic signal-green chromaticity ranges have been purposely inclined toward bluish green so as to be distinguishable from yellow and red signals by a red-green blind observer; the name bluish green is quite suited to part of this range. Although the standard specifications for railroad signal blue and aviation blue spread into the bluish purple area, the lights actually used would be called by this system either blue or purplish blue.

Thus from the tables, the agreement of these data both with the

TABLE II. Comparison of formal color specifications with the proposed color names.

Color Specifications	Color name in proposed system	Remarks
Marine and traffic signal red	Red	
Railroad signal red	Red	
Railroad highway crossing red	Red and reddish orange	
ANC aviation red	Red and reddish orange	Neon light is one limit and would be called reddish orange
ANC identification red	Red	
Marine and traffic signal yellow	Yellowish orange and orange	
Railroad signal yellow	Orange	
ANC aviation yellow	Yellowish orange and orange	
ANC identification yellow	Reddish orange and orange	
Marine and traffic signal green	Green and bluish green	Colorblind see this as nearly neutral
Railroad signal green	Green and bluish green	
ANC aviation green	Yellowish green, green, and bluish green	
ANC identification green	Yellowish green and green	
Railroad signal blue	Blue, purplish blue, and bluish purple	Actual signals are either blue or purplish blue
ANC aviation blue	Blue, purplish blue, and bluish purple	
Railroad signal purple	Purplish blue, bluish purple, and purple	Railroad signal purple is not used as a chromaticity term in the usual sense but designates a spectral composition separated into red and blue components by the chromatic aberration of the eye

previously reported data for unitary and other hues and with the names used in the standard specifications, though not perfect, is fairly good. It must be remembered in this connection that the suggested system embodies a greater number of color names than were used in previous studies of signal-light color systems such as those by McNicholas (17) and Holmes (5). In those studies a limited number of color names was allowed and each name therefore applied to a wide range of hue. These ranges were selected for maximum visual contrast between adjacent named color ranges and they apply to signal-light systems of the corresponding number of colors. The names applied to the ranges, however, are somewhat arbitrary and not necessarily true descriptions of the color ranges selected. The suggested system, on the other hand, is intended to provide appropriate color names for the colors of all self-luminous bodies. However, considerable work remains to be done before the diagram defining these color designations can be recommended in final form.

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WHAT CONSTITUTES PROFESSIONAL PRACTICE?

Am I really a good optometrist? Am I properly and scientifically trained to screen out those cases requiring the services of an ophthalmologist? Am I technically equipped to do so? Have I the instruments necessary to do a good piece of refractive work? Do I know as much as I should know about orthoptics? Am I a competent orthoptist? Do I keep abreast of new refractive and orthoptic techniques? Am I more interested in the refraction, diagnosis and prognosis of each case than I am in dispensing materials to the patient? Is the "sale" of my professional services paramount to the dispensing of materials? Do I always refer

doubtful cases of possible or suspected ocular pathology rather than prescribe for the patient through routine optometric methods? Am I truly interested only in making patients visually comfortable and efficient? Is the well-being of the patient more important to me than the fees I collect? Do I refuse to prescribe materials or orthoptic treatments in cases where these are not needed? Do I cooperate with members of other professions? Do I weigh and consider their judgment in cases I am now working on? Do I always speak well of other professional men and never depreciate their ability or skill? Do I always speak well of my own optometric colleagues? Do I speak well of the technical work they do? Is my own practice conducted in such manner as to bring no discredit upon optometry because of the way I practice? Is the location of my office a proper one for a professional man? Does my office give the public the impression that a professional man is in charge? In my general and civic contacts do I conduct myself as a professional man? Do I, as a professional man, regularly buy books and technical journals to keep myself informed as to the progress my profession is making? Because of my knowledge and my practice, have I the standing that I should enjoy in my community as a respected professional man?

The answer to each of these questions should be *yes*. If you have truthfully answered any one or more of these 24 questions in the negative, you are failing in your attempt to practice professionally.

You will note, as you review these questions, that there is a good deal more to practicing professionally than the mere location of an office, or the type and character of the promotional material you use if you use any at all. To be sure these are important, but what is even more important is the attitude of mind and heart with which you approach your work. The true professional man puts service to his patient above all else, and only when he does is he in a position to serve and succeed.

CAREL C. KOCH

ASSISTANCE FOR COMMUNITIES NEEDING MEDICAL AND DENTAL SERVICES

An important opportunity for communities to relieve shortages of medical or dental service has been provided through recent federal legislation, effective December, 1943.

Under the new law, the United States Public Health Service is authorized to make certain payments to physicians and dentists to relocate in communities needing medical and dental services. The function of the

United States Public Health Service is to bring together the needy community and the doctor who volunteers to serve under the plan. Costs to the applicant community will be around $300, the exact costs to be borne 75 percent by the federal government and 25 percent by the community. This will provide moving expenses and a monthly allowance of $250, for three months, while the doctor establishes his new practice.

The application must be filed by the legally authorized representative of the community (mayor, city manager, etc.), through the state health department which must first approve and then forward the application and the community's payment of $300 to the United States Public Health Service.

The physician or dentist must be licensed to practice in the state, must be acceptable to the community and agree to practice in that community for at least a year. He remains in private practice, with the same relationship to the community as any other private doctor. Initiative must come from communities and volunteering practitioners before the United States Public Health Service can act under the new legislation.

Optometric service is also important to communities. Why was such a bill permitted to pass without the inclusion of optometry in its scope? Our small rural towns need optometrists as well as physicians and dentists. Perhaps a way can be found to amend the act to include optometric care. This matter certainly should be important enough to justify some study on the part of the A. O. A. officials.

A. VIRGINIA FLATTEN

OCULAR PHYSICAL THERAPY

Ocular physical therapy is defined as that branch of ocular treatment which aids in the amelioration of ocular symptoms, imbalances of the accommodative convergence relationships and diseases of the eyes by artificially produced sources of heat and light and by mechanical and electrical energies properly applied to the eyes and orbits.

Both optometry and ophthalmology have something to gain by the use of certain physical agents. As an adjunct to orthoptic procedures in optometry, physical therapy is of value, as it stimulates circulation if used in certain ways or it acts as a sedative if used in other forms. In ophthalmology it has several uses in the treatment of pathology. In general, it can be said that heat, light and mechanical energies can be conveyed to the eyes by sunlight and artificial sources of radiation and by various forms of electrical currents. These physical agencies or forces acting from

without may be used to relieve pain, reduce inflammation, restore normal function and improve the general ocular tone.

In optometry Kurtz[1] was the first to present the widespread uses of physical agents. His results demonstrated their value and his work introduced these techniques to many of his fellow optometrists. However, in the field of electrical therapeutics, the benefits of which have not been fully exploited in optometry, we find that these forms of physical therapy are still an enigma to the average optometrist.

This is also probably true in ophthalmology where the greater portion of the practitioners make no use of physical therapy, despite their obvious value in some forms of therapeutic work. From a treatment standpoint in eye work the galvanic current, the sine wave massage and the short wave diathermy oscillatory current all have much to offer, and it is with some degree of satisfaction that we note a growing interest among both optometrists and ophthalmologists in these treatment aids. In optometry, without question, physical therapy will eventually come into its own. There are definite advantages in the employment of some of the commonly known physical agents in orthoptic work and it behooves optometrists to experiment with them in a wider group of cases so that more specific techniques may be established.

CAREL C. KOCH

PUBLISHER'S NOTICE—As a reader of this publication, you no doubt have noticed that the pages in your copy of the AMERICAN JOURNAL AND ARCHIVES are lighter in weight than formerly. To cooperate fully in our war program of conservation of resources, this journal is now printed on 50 pound weight book stock paper instead of the 80 pound paper formerly used. Our plans for 1945 call for the usual 12 issues, each of 64 pages, plus cover. The Academy and the Publishers are glad to make this contribution to the Nation's War Effort. With this issue, the annual subscription rate goes to $5. In Canada $5.50 and foreign $6.

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[1]J. I. Kurtz. The Principles and Practice of Ocular Physical Therapy for Optometrists. Published by the AMERICAN JOURNAL OF OPTOMETRY, Minneapolis, Minn., 1930.

ACADEMY ELECTS ANDREAE AT SPIRITED SESSION

COLUMBUS CHOSEN AS NEXT MEETING PLACE

The 1944 annual meeting of the American Academy of Optometry was held in the Stevens Hotel at Chicago, Illinois, on December 10, 11 and 12. This session of the Academy was highly successful. Viewed from the angle of the technical papers presented, the attendance, the interest shown by members of the Academy in the problems that were introduced, and by the attitude of the Fellows toward the parts they are to play in the future development of the profession itself, the meeting just concluded equalled if not surpassed any previous meeting of this group. The program being held during wartime, there was naturally some apprehension as to the ability of the hotel to adequately serve our group, but despite war restrictions, the sessions were held according to schedule and the hotel did everything in its power for the convenience of the optometrists present. We were very well served.

The sessions were opened Sunday morning with an informal report from the presiding officer, Dr. Arthur P. Wheelock of Des Moines. As President, Dr. Wheelock reviewed the activities of the Academy since its last meeting and placed before the membership certain problems that now confront the members of our profession. These matters were dealt with by the Academy at a later session.

Following Dr. Wheelock's message, the Secretary, Dr. J. Fred Andreae of Baltimore, presented the Secretary and Treasurer's annual report, after which the Chairman of each of the Academy's standing committees reviewed their activities. Each report was in turn accepted and will be published in this Journal.

The next two days were devoted to the reading and discussion of papers presented by members of the Academy. An outline of these papers has already appeared in this publication and the papers themselves will be presented in subsequent issues of the AMERICAN JOURNAL AND ARCHIVES. As usual, the material presented in these original papers was carefully prepared and dealt with problems of present and future importance to the profession as a whole.

The Academy Round Table dinner was held in accordance with the Academy tradition on the second night of the session. Dr. Carel C. Koch of Minneapolis was the speaker on this occasion.

The closing meeting of the Academy was devoted to a consideration of the following problems and in each case the Academy took a vigorous position relating to the issue before it. These were, (1) the future attitude of the profession towards the "private school" question, and (2) the attitude to be taken by the profession in its relation with ophthalmology.

The first question was that of the private schools. This was brought to the fore by the reading of a communication to the assemblage from Dr. Charles Sheard of Rochester, Minnesota, in which he indicated that it was imperative that optometry rapidly abandon its private schools and center its entire educational facilities under the broad supervision of state universities, or more properly, the tax-supported educational centers to which medical schools are affiliated. A discussion of Dr. Sheard's communication brought forth the general opinion that while the Academy was willing to concede that optometry courses now connected with universities were doing an excellent job, there seemed to be no ground for the specific criticism aimed at the "private schools." The consensus of the meeting seemed quite definitely to be that our private schools had performed in a very adequate manner and in optometry as in other fields of learning, the private school had its place. It was forcefully pointed out that many of the country's leading educational institutions were private schools, Yale and Princeton being in this category, and that many other institutions of learning occupying useful spheres of activity in the educational field were not tax-supported. Until a clearer understanding was had of the part optometrists are to play in the public health programs of the future it was agreed it would not be advisable to now take a position against the private schools.

The second question which was vigorously discussed by the professional leaders present was the attitude to be taken by the profession in its coming relations with ophthalmology. Here, after considerable discussion, the consensus was as follows. That as a group, optometrists had no quarrel with ophthalmology. That as a group, optometrists had the technical qualifications to do a satisfactory job of caring for the visual requirements of the people. That as a professional group, optometrists should not accept a position subservient to members of other professions. It was the consensus also that modern refractive and orthoptic techniques had been largely developed by optometrists and that the service we were now rendering the public in the refractive eye field was of such character as to make the peoples of the United States the best visu-

ally cared for group in the world today. Because of these factors it was the general agreement of the members present that optometrists insist on full professional status in all dealings having to do with the visual care of the public. It was further the consensus that the Academy should take the initial steps to represent professional optometrists in optometry's dealings with other professions, and that every proper step be taken to further increase Academy membership.

Following the business session, the name of Dr. J. Fred Andreae of Baltimore, Maryland, was placed before the Academy by the Nominating Committee as its nominee to succeed Dr. Arthur P. Wheelock of Des Moines, Iowa. Dr. Andreae served as Secretary of the Maryland Association of Optometrists from 1916 until 1933. He served as President of the Maryland Association of Optometrists in 1937 and again in 1938. He served as Secretary of the International Board of Examiners in Optometry from 1926 until 1943, and as Secretary of the Maryland State Board of Examiners from 1917 until 1943. He served as President of the American Optometric Association in 1930 and again in 1931, and he has served the Academy as its Secretary for the past 16 years.

Dr. Andreae was unanimously chosen as President of the American Academy of Optometry.

The other officers elected were Dr. Harold M. Fisher, Mt. Kisco, N. Y., Vice President; Dr. Carel C. Koch, Minneapolis, Minn., Secretary-Treasurer; and Drs. Arthur P. Wheelock, Des Moines, Iowa; Edward W. Dewey, Battle Creek, Mich.; R. E. Bannon, Hanover, N. H., D. G. Hummel, Cleveland, Ohio, and E. A. Hutchinson of Los Angeles, Calif., as members of the Executive Council.

Following the annual election, Dr. Julius Neumueller of Philadelphia presented the Academy report on the next meeting place of the Academy. After committee conferences with the officials of the School of Optometry, Ohio State University, it was decided that the next session of the Academy be held at Columbus, Ohio, on December 9, 10, 11, 1945.

Before adjourning, a number of the Fellows paid tribute to the excellent work accomplished by the Academy during Dr. Wheelock's term of office. In spite of the war, Dr. Wheelock has succeeded in leading the Academy to the high point of excellence now occupied by this organization. Not only have many of the refinements of practice originated within its ranks, but much of the present day accepted development in

professional standards and ethics can be traced to the work of this organization, which, under Dr. Wheelock's leadership, has reached the point of largest membership in its history.

The convention closed with the unanimous action of the members in congratulating Dr. Wheelock on his successful term as President of the American Academy of Optometry.

A. VIRGINIA FLATTEN

ACADEMY REGISTRATION AT CHICAGO MEETING

Dr. F. G. Ottaway, Toronto, Canada; Dr. George Keevil, Toronto, Canada; Dr. E. Petry, Rochester, N. Y.; Dr. D. G. Hummel, Cleveland, Ohio; Dr. Richard Feinberg, New York, N. Y.; Dr. Clyde G. Hathaway, Pontiac, Mich.; Dr. Laurence T. Folsom, South Royalton, Vt.; Dr. Ward C. Vrouwenfelder, Kalamazoo, Mich.; Dr. William Henning, Columbus, Ohio; Dr. Mathew Alpern, U. S. Army, home address, Akron, Ohio; Dr. Robert Jordan, Cleveland, Ohio; Dr. M. S. Willis, Elyria, Ohio; Dr. George A. Parkins, Ord, Nebr.; Dr. Henry W. Hofstetter, Columbus, Ohio; Dr. Alton G. Billmeier, Denton, Md.; Dr. Tobe C. Self, Nashville, Tenn.; Dr. A. C. McCullar, Lewisburg, Tenn.; Dr. J. Fred Andreae, Baltimore, Md.; Dr. Carel C. Koch, Minneapolis, Minn.; Dr. J. K. Galloway, Devils Lake, N. D.; Dr. O. L. McCulloch, Holyoke, Mass.; Dr. John W. Mogey, Flushing, Long Island, N. Y.; Dr. A. H. Wittlig, Cleveland, Ohio; Dr. A. A. Schmidt, Cleveland, Ohio; Dr. H. Harrison Peters, Cleveland, Ohio; Dr. Ralph J. Hays, Harlan, Iowa; Dr. George H. Warkentine, Cedar Rapids, Iowa; Dr. J. S. Nupuf, Canton, Ohio; Dr. J. G. Shelton, Austin, Texas; Dr. Irvin M. Borish, Kokomo, Ind.; Dr. S. H. Shurin, Kansas City, Mo.; Dr. Arthur P. Wheelock, Des Moines, Iowa; Dr. Richard Hall, Cleveland, Ohio; Dr. O. H. Johnson, Jonesboro, Ark.; Dr. E. L. Higgins, Cleveland, Ohio; Dr. W. E. Dewey, U. S. Army, Battle Creek, Mich.; Dr. Harold M. Fisher, U. S. Army, Mt. Kisco, New York; Dr. Glenn Fry, Columbus, Ohio; Dr. Frances P. Marshall, Washington, D. C.; Dr. G. F. Kintner, Wabash, Ind.

Dr. Wm. Greenspon, Bluefield, W. Va.; Dr. Julius Neumueller, Philadelphia, Pa.; Dr. Orvis C. Wells, Murray, Ky.; Dr. Mary Clay, Fort Wayne, Ind.; Dr. Wm. M. Kinney, Los Angeles, Calif.; Dr. Rudolph Ehrenberg, Granite Falls, Minn.; Dr. E. W. Larson, Hibbing, Minn.; Dr. R. W. Tubesing, Richmond, Ind.; Dr. L. J. Kehoe, Flint, Mich.; Dr. A. J. Rowe, Cleveland, Ohio; Dr. K. S. Rowe, Fostoria, Ohio; Dr. C. E. Lonsway, Cleveland, Ohio; Dr. V. J. Ellerbrock, Hanover, N. H.; Dr. R. A. Dister, Cleveland, Ohio; Dr. Clarence Morris, Fort Wayne, Ind.; Dr. James J. Wey, Paynesville, Ohio; Dr. J. J. Brody, Sheldon, Iowa; Dr. T. E. Miller, Elgin, Ill.; Dr. Eugene Freeman, Chicao, Ill.; Dr. John P. Davey, Indianapolis, Ind.; Dr. Kenneth Kintner, Mishawaka, Ind.; Dr. W. T. Stevesson, Chicago, Ill.; Dr. John C. Maheu, Springfield, Mass.; Dr. H. E. Pine, Chicago, Ill.; Dr. A. N. Abbott, Shawano, Wis.; Dr. Edward J. Buda, Chicago, Ill.; Dr. B. Botious Sullivan, Wichita, Kan.; Dr. F. W. Jobe, Rochester, N. Y.; Dr. Albert C. Evert, Cleveland, Ohio; Dr. Jos. Greger, Cleveland, Ohio; Dr. Paul Bolder, Southbridge, Mass.; Dr. R. E. Bannon, Hanover, N. H.; Dr. Rita Walsh, Hanover, N. H.; Dr. J. C. Copeland, Chicago, Ill.; Dr. C. L. Grigware, Grand Rapids, Mich.; Dr. H. E. Cross, Alexandria, Va.; Dr. W. J. Heather, Southbridge, Mass.; Dr. Wm. Smith, Boston, Mass.; Dr. Lloyd Dolbear, Lorraine, Ohio; Dr. F. Stanley Leverich, Aurora, Ill.; Dr. F. J. Kellogg, Mason, Mich.; Dr. A. R. Rochte, Port Ridge, Ill.; Dr. W. B. Needles, Chicago, Ill.; Dr. Louis W. Palm, Kansas City, Mo.; Dr. Matthew J. Luckiesh, Cleveland, Ohio.

PROCEDURE AND INSTRUMENTATION

Rudolph H. Ehrenberg

A department wherein discussions will be carried on relative to the value of various experimental and clinical techniques as employed by practicing optometrists, and also in which the instruments used by optometrists in various phases of their work, will be subjected to some critical evaluation.

KEYSTONE NEW MANUAL

Keystone View Company announces that a completely revised Part IV of their Manual of Keystone Orthoptic Training is now ready for distribution.

This manual covers techniques applicable to the T10A Service with the Tel-Eye-Trainer. In 1942 a revision in Part III of this series covered the techniques with the Telebinocular.

A feature of Part IV is a discussion of the various uses of each of the Teleroters. A new rotor number 16 is now available, and as a light control is for tachistoscopic training via the Tel-Eye-Trainer.

Requests for Part IV from Tel-Eye-Trainer users will be taken care of promptly by Keystone View Company, Meadville, Penna.

INSTRUMENTATION FOR SCREENING INDUSTRIAL VISION

The last few years has seen an alteration in the concepts of vision on the part of those in industry, the schools and on the part of those persons engaged in refraction. This is perhaps in no way more clearly demonstrated than by the changes which have occurred in the thinking of those who have to do with vision and visual skills of persons working in industry. In the years gone by most of the screening procedures used in industry were for the purpose of culling out and correcting the vision of those who had eye defects. This was worthwhile to the persons involved but left much to be desired in the possible services rendered.

It has been apparent that it was necessary to find a method by which the visual performance of any employee could be measured; to discover how well this individual performed when compared with other workmen and to determine if the individual's visual performance was adequate for that particular job. A good beginning was made in this direction with a meeting of minds of Bausch & Lomb scientists and those of Drs. Tiffin and Wirt of Purdue University and Drs. Kuhn of Gary, and Shephard of Chicago. The results of their studies, experimentations and consultations have produced the Ortho-Rater.

The Ortho-Rater is a stereoscopic device designed for testing visual performance in industrial plants. It is in no way a diagnostic instrument. Its purpose is that of visual classification and placement and it establishes a basis by which the individual workman may be assisted to fit into a particular job, for which he is visually most capable.

It has been pointed out by Jobe, "We are not concerned with the cause of the variation in visual performance, but only in the effect the variation will have upon industrial performance."[1] Likewise it is expected that this variation in visual performance among a large population would follow a normal distribution curve. If the usual clinical tests and procedures of the past were used in mass screening there would be a preponderance in the 20/20 group. This is because the ordinary test chart does not have sufficient steps in the size of test characters. Also it lacks test conditions well enough controlled to obtain fine discrimination of acuity. The value of such testing would be negligible, because as Tiffin has found, there is a negative relationship between production and distance visual acuity.[2] One of the conditions for a satisfactory battery of tests is to have a sufficient number of steps so that satisfactory end results can be reached for any individual taking the tests.

Over a period of years a number of models were tried by unbiased observers and their experiences led to what is the present recognized type of instrument. The type of stereoscopic device settled upon was the Brewster type. An obvious requirement was constant illumination for both the distance and near tests. The individual to be tested must be in proper position before the instrument, and there must be sufficient flexibility for use in any part of an industrial plant.

In the present Ortho-Rater the test slides are transparencies mounted in rotating drums, these slides illuminated from a centrally located lamp. A separate drum is used for the distance tests and another drum for those at near point. In the present instrument the optical system has been made long enough to eliminate, insofar as possible, the instrumental effects on accommodation and convergence. In changing from the distance tests to those at the near point, the viewing box is rotated downward to the proper position by tilting the instrument and its lenses so that a person tested who is wearing bifocals will automatically look through his near point correction. The change in head position has no bearing on the end results; likewise the newest model has been diaphrammed to obtain satisfactory results in the phoria tests at both

distance and near point. All controls for the operation of the Ortho-Rater have been placed on the right side of the instrument for convenience.

Concurrent with the development of the Ortho-Rater, experiments were made to determine which types of tests would be used. Most every conceivable test was tried and many were discarded. It appeared that some variation was needed for those to be used for industrial screening as against their use clinically. Those that seemed best suited were altered and tried again until the final battery of twelve was established.

In the final analysis the visual skills to be tested were monocular and binocular visual acuity, horizontal and vertical phorias, stereopsis and color. The acuity and phoria tests are to be made for both distance and the near point; those of stereopsis only at the far point.

The slide for visual acuity varies radically from the familiar Snellen test type because of a necessity to have such characterization as not to be affected or influenced by one type of refractive error more than another. Likewise its design had to be such that education or the ability to read could not be an influencing factor. For this reason a checkerboard pattern was selected with the use of alternating light and dark squares, eliminating any selectiveness for astigmatism and yet to be readily understandable by all individuals. Five of these blocks in a diamond diagram made it possible to use the checkerboard pattern in all five positions. The center position has not been used since the experimental work proved that a character in that position was more difficult to recognize than a like character of equal size in one of the four outside positions. The primary interest appears to be in testing for form acuity and not the brightness differences as such. The blocks are made with small alternating light and dark areas so that they may gradually appear as a neutral gray. When the checkerboard pattern becomes too small to be distinguishable it, too, becomes a neutral gray and could not be differentiated from the other four blocks thus lending to the objectivity desired. This final form would, with a minimum of explanation to the individual, give a normal distribution curve in acuity for large groups of persons tested.

In determining the slides to be used for phoria tests the research people concluded both the vertical and lateral phorias should be measured at the same time. The arrow and digit phoria test was selected. This, however, would allow the arrow to wander and appeared inadvisable because of difficulties in administering the test. In the adopted form,

three dots were placed above the arrow to lend a slight fusional effect for stabilizing purposes. This lessened the tendency for the scores to pile up at any one point. A checkerboard design was also incorporated in the body of the arrow as a control to accommodation. Also encountered was an instrument problem which had resulted in the placing of apertures on the Ortho-Rater to avoid the presence in the field of two similar boundaries.

The slide used for studying stereopsis is based upon exact photography. The rather simple design adopted proved to be the most satisfactory.

The color slide is a kodachrome transparency of four ishihara plates. There was some question with regard to the inclusion of this test because of a lack of certainty of what was being tested, yet its correlation with industrial performance made the inclusion advisable.

Where it is intended that large groups use the services of any technique or instrument the type of record card is important. The card system which appears with the Ortho-Rater includes not only a graphing of the individual's visual tests and regular information, but also slotting and holes along each margin for selection purposes.

The importance of vision in industry can be satisfactorily demonstrated only in relation to acceptable industrial criteria such as hourly production, proportion of work rejected because of defective workmanship, supervisor's rating of employee, employee absence, rate of labor turnover or some other measurable aspect of employee value to the company. Visual characteristics which correlate with these industrial criteria differ from job to job and cannot consistently be predicted without correlative evidence.[3] Thus the operators who are better on the job tend to score higher on this visual test than operators who are not so efficient. There are exceptions, but the average visual score is consistently higher from the poorest to the best operators.[4]

In the writer's opinion, the Ortho-Rater provides an opportunity for industry to weigh vision as an economic factor. The end results of these tests should prove far reaching. For example, if visual skill tests had been made on the men in a certain plant, a switch from war production to peace time work would find the employment director more capable of adjusting his men from one type of work to another. Furthermore, he and his visual consultant could now recognize the particular visual skills most important to certain jobs. Then pick men with those

skills, and where the skills are not normal urge the worker to correct the visual defect.

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[2]Tiffin & Wirt, Transactions, Am. Academy of Opthalmology, pp. 10.
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SPECIAL REPORTS

REVIEW OF PROPOSED BRITISH HEALTH SERVICE*

Pearl McIver, R.N.
U. S. Public Health Service

The proposed national health service for England, Scotland and Wales is aimed "to ensure that everybody in the country—irrespective of means, age, sex, or occupation—shall have equal opportunity to benefit from the best and most up-to-date medical and allied services available."

Britain has had a national health insurance plan for employed persons since 1911. Both physicians and workers praise the accomplishments under that plan, but both groups believe that the scope of national insurance is not broad enough. In submitting this report the Minister of Health says: "There is no question of having to abandon bad services and to start afresh. Reform in this field is not a matter of making good what is bad, but of making better what is good already."

The services to be provided include every branch of medical and allied care from minor ailments to major medicine and surgery; mental as well as physical health; specialist services for such conditions as ocular problems, tuberculosis, infectious diseases, maternity, orthopedics, et cetera; all necessary drugs, and a wide range of appliances. The services of doctors, midwives, nurses, refractionists and dentists (to a limited degree) will be provided without fees to the individual patient.

The general principles to be observed include:

(1) Freedom for people to use or not to use these facilities at their own wish; no compulsion into the new service, either for patient or for

*An abridgment of the material, "A National Health Service for England, Scotland and Wales." American Journal of Nursing, Vol. 44, No. 9, pp. 845-846, 1944.

doctor; no interference with the making of private arrangements at private cost, if anyone still prefers to do so.

(2) Freedom for people to choose their own medical advisers under the new arrangement as much as they do now; and to continue with their present advisers, if they wish, when the latter take part in the new arrangements.

(3) Freedom for the doctor to pursue his professional methods in his own individual way, and not to be subject to outside clinical interference.

(4) The personal doctor-patient relationship to be preserved, and the whole service founded on the "family doctor" idea.

(5) These principles to be combined with the degree and kind of public organization needed to see that the service is properly provided—e.g., to ensure better distribution of resources and to give scope to new methods, such as group practice in health centers.

The entire plan will center in the Minister of Health for England and Wales and in the Secretary of State for Scotland, who in turn will be directly accountable to Parliament. The Minister of Health will have a "Central Health Services Council" which will serve in an advisory capacity. It is proposed that this council will be largely medical but will include on its membership nurses, dentists, midwives, pharmacists, hospital administrators, et cetera. In addition to this advisory council, there will be a Central Medical Board (composed mainly of members of the medical profession) which will be an executive body acting under the direction of the Minister. This board will be the "employer" with which the practitioner enters into contract and will concern itself with the distribution and welfare of the practitioners.

On the local level, the county or county borough will be the governmental unit, but where the unit is too small for effective administration several units may be combined and a "joint authority" made up of county and county borough councils will be the administrative body. This group will submit unified plans to the Minister of Health for all branches of health service needed in the area.

Physicians may participate in the plan on a part- or full-time basis or not at all. It is believed that many young physicians will prefer full-time participation but that the older physicians may enter on a part-time basis. A changed attitude in patient and doctor is anticipated. "The family doctor must try to become the general adviser in all matters concerned with health (no less than with disease)." It is

hoped that the patient will not wait until he is ill before consulting the doctor.

Consultation service from the best medical specialists is to be made available to every general practitioner without cost to him or to the patient. "Health centers" or facilities for group medical practice which provide all of the necessary services, such as x-ray, laboratory, nursing, and secretarial will be furnished at convenient locations.

The proposed program will be financed partly from central funds, partly from local rates (taxes), and partly from contributions of the public under any scheme of social insurance which may be brought into operation.

This proposal on a national health service (often referred to as the "White Paper") has been prepared to stimulate full and free discussion of the whole plan by professional and lay groups. Criticisms from all these groups will be considered before the plan, or any modifications of it, becomes law.

U. S. ARMY OPTOMETRIC CORPS

A. Virginia Flatten
Minneapolis, Minn.

The elections are over. Congress has reassembled. New members are in their seats and a new year is at hand. With its coming brings a new responsibility to all optometry. A responsibility *now* to secure adequate recognition for those optometrists serving as refractionists with the U. S. Army. A responsibility which makes the establishment of a U. S. Army Optometric Corps a "must" which takes precedent over all other matters now before the profession.

Army optometrists should have commissions. These will never be granted without appropriate congressional action. Now is the time for optometry to act. Further delay is inexcusable as our men in uniform deserve the support we can give them from the home centers.

The following joint resolution[1] of the Assembly and Senate of the State of California should spur all optometrists into positive action.

Whereas, For the efficient functioning of the members of the armed forces of the United States it is necessary that their visual requirements be adequately cared for; and

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[1]California Optometrist. Vol. 13, No. 2, p. 9, 1944.

Whereas, The War Department estimates that 20 percent of United States soldiers require correction of their visual needs by the use of eyeglasses (approximately 2,200,000 individuals); and

Whereas, At present the supplying of the visual needs is under the direction of the Medical Corps administered by the Surgeon General of the Army; and

Whereas, To help fulfill these needs the Medical Corps is using the services of approximately 1,000 optometrists; and

Whereas, The Surgeon General and The Adjutant General have declared that more optometrists are needed to insure adequate visual care for all members of the armed forces; and

Whereas, These optometrists are being drafted as privates, and only in rare instances are they permitted to attain even noncommissioned rank; and

Whereas, All these optometrists must be (1) Graduates of a four year professional course in optometry at an approved university or school of optometry, and (2) Licensed in one of the States of the United States; and.

Whereas, Many optometrists have sought and obtained commissioned rank in other branches of the United States Army, so that they might attain the recognition accorded others with similar education and professional attainments; and

Whereas, With adequate recognition most of the optometrists who are now serving in other branches of the armed forces would transfer to an Optometric Corps and help provide the needed personnel; and

Whereas, Many optometrists now in private practice would join the armed forces if they were able to do so in the manner permitted to other professionals, such as physicians, dentists and nurses; and

Whereas, The Surgeon General has stated that optometrists cannot be commissioned in the Medical Corps, as only licensed physicians can receive such commissions; now, therefore, be it

RESOLVED by the Assembly and Senate of the State of California, jointly, That the Legislature of this State indorse the formation of an Optometric Corps in the United States Army and in the Army of the United States and request the members of Congress to enact the same into law; and be it further RESOLVED, That the Chief Clerk of the Assembly prepare and transmit copies of this resolution to the President

and Vice President of the United States, to the Speaker of the House of Representatives of the Congress of the United States, to each Senator and Member of the House of Representatives from California in the Congress of the United States, and that the Senators and Representatives from California are hereby respectfully urged and requested to support the establishment of the said Optometric Corps.

BOOK NOTICES AND REVIEWS

Books received are acknowledged by notices in this department. Special selections will be made for more extensive review in the interest of our readers as space permits.

THE PRACTICE OF ORTHOPTICS. G. H. Giles, F.B.O A. (Hons.) F.S.M.C. Published by Hammond, Hammond & Company, Ltd., Publishers, 36 Great Russell St., London, W.C.1., England. 366 pages. Illustrated. Cloth. 1944.

The author reviews the theory and clinical aspects of orthoptics and presents in considerable detail a review of the specific techniques used in this work. Particularly are these techniques reviewed as these relate to the treatment of squint. In this category this text is very complete. Less space is devoted to the treatment of minor imbalances of the accommodative-convergence relationships because one gathers that British optometrists are less prone to advise orthoptic treatments as generally as do many optometrists in the United States. In treating squint the author believes that the best results are obtained when the patient is between 14 and 20 years. The author's techniques generally follow those of Cantonnet, but his presentation of the subject is far more readable than that of the French ophthalmologist. Giles is a staff member of the London Refractive Hospital and in this monograph has placed a wealth of practical experience and learning.

CAREL C. KOCH

ANNOUNCEMENTS

PENNSYLVANIA STATE COLLEGE ANNUAL SEMINAR ON READING DISABILITIES

The annual seminar on reading disabilities will be held at the Pennsylvania State College, January 29 to February 2, inclusive. The program will be under the general supervision of Dr. Emmett A. Betts, Research Professor and Director of the Reading Clinic. The sessions should be of particular interest to optometrists who are invited to attend. The complete program follows.

REGISTRATION

Registration should be made in advance with Miss Betty J. Haugh, Reading Clinic Secretary, Pennsylvania State College, State College, Pa. The registration fee for the week is $5.00. Copies of this program and transportation schedules may be obtained from Miss Betty J. Haugh, Reading Clinic Secretary. There are two hotels in town—The Nittany Lion Inn and the Hotel State College. The Inn is managed by Mr. John D. Lee; the Hotel by Mr. McLaughlin. Letters for reservations should be addressed to either of these two men.

THE READING CLINIC
SCHOOL OF EDUCATION

The Pennsylvania State College
State College, Pennsylvania

Annual Seminar on Reading Disabilities
January 29 - February 2, 1945

Preliminary Program
Monday, January 29

Theme: Approaches to the Analysis of Reading Disabilities
Chairman: Dr. Carroll D. Champlin

8:00 - 9:00 a.m.	*Registration*. Room 8, Burrowes Education Building
9:00 - 10:30 a.m.	A Differentiated Approach to the Analysis of Reading Disabilities—Dr. Emmett A. Betts
10:45 - 11:30 a.m.	Discussion: Seminar on Case Histories—Dr. Bruce V. Moore
	Theme: Psycho-physiological Factors
	Chairman: Dr. William T. Hunt, Jr., M.D.
1:30 - 3:45 p.m.	Neurological Factors in Reading Disabilities Dr. B. J. Alpers, M.D.
4:00 - 5:00 p.m.	Visual Readiness for Reading—Dr. James A. Bing

Tuesday, January 30

Theme: Psycho-educational Factors
Chairman: Dr. J. E. DeCamp

9:00 - 9:40 a.m.	Social and Emotional Factors in Reading Disabilities— Dr. Clifford R. Adams
9:50 - 10:50 a.m.	Speech and Hearing—Dr. Eugene T. McDonald and Miss Margaret Raabe

11:00 - 11:50 a.m.	Studies of Central and Peripheral Dominance—Mr. S. D. Melville Theme: Capacity for Reading Chairman: Dr. C. O. Williams
2:00 - 2:50 p.m.	Verbal and Non-Verbal Tests of Intelligence—Dr. B. V. Moore
3:00 - 3:50 p.m.	Determining Hearing Comprehension—Dr. Emmett A. Betts
4:00 - 4:50 p.m.	Special Psychological Tests of Reading Disabilities—Mr. S. D. Melville
	Wednesday, January 31 Theme: Determination of Reading Achievement Chairman: Dr. C. C. Peters
9:00 - 9:50 a.m.	Discovering Reading Levels and Needs—Dr. Emmett A. Betts
10:00 - 10:50 a.m.	Demonstration—Dr. Emmett A. Betts
11:00 - 11:50 a.m.	Standardized Tests of Reading Achievement—Mr. S. D. Melville Theme: Case Typings and Prognosis Chairman: Dr. Frank Butler
2:00 - 2:50 p.m.	Discovering Specific Reading Needs and Determination of Case Typings—Dr. Emmett A. Betts
3:00 - 3:50 p.m.	Activities of the Reading Clinic Laboratory School—Miss Carolyn M. Welch
4:00 - 4:50 p.m.	Discussion: Summary of Analysis—Reading Clinic Staff
	Thursday, February 1 Theme: Directed Reading Activities Chairman: Dr. Florence K. Taylor
9:00 - 9:50 a.m.	Directed Reading Activities—Dr. Emmett A. Betts
10:00 - 10:40 a.m.	Demonstration—Miss Carolyn M. Welch
10:50 - 11:30 a.m.	Discussion—Dr. Emmett A. Betts and Miss Carolyn M. Welch Theme: Experience Approach Chairman: Dr. E. B. Van Ormer
2:00 - 2:50 p.m.	Developing Basic Reading Abilities—Dr. Emmett A. Betts
3:00 - 4:50 p.m.	Demonstration—Miss Carolyn M. Welch
	Friday, February 2 Theme: Word Perception Chairman: Miss Mable Kirk
9:00 - 9:50 a.m.	Kinaesthetic Techniques—Dr. Emmett A. Betts
10:00 - 10:20 a.m.	Demonstration—Miss Ruth L. Roesler
10:20 - 11:30 a.m.	Sequential Development of Word Perception Abilities—Miss Carolyn M. Welch
2:00 - 4:00 p.m.	Summary of Seminar—Reading Clinic Staff

NEW YORK STATE OPTOMETRIC ASSOCIATION MEETING

There will be a joint meeting of the New York Illuminating Engineering Society and the New York Optometric Societies on January 18, 1945, 7:30 P. M., at the General Electric Auditorium, 570 Lexington Avenue, New York City. Optometry will be represented by Dr. Richard Feinberg, F.A.A.O., who will speak on industrial vision. The speaker for the Illuminating Engineering Society will be Mr. Cazamer L. Crouch, technical secretary of the Society. Mr. Crouch

will speak on illumination values in terms of quality and quantity and the importance of illumination in eye conservation. Mr. Crouch has done a great deal of research in the field of illumination in vision and is the author of "Glare and Lighting Design." Optometrists in the metropolitan New York area are urged to attend.

ABSTRACTS

A department in which will appear abstracts of the literature of optometry, ophthalmology and applied optics. These will be classified according to the following list although contributions to all sections will not necessarily appear in each issue.

1. Ocular Refraction.
2. Physiological Optics and Color Vision.
3. Ocular Muscles.
4. Orthoptics and Reading.
5. Anatomy, Histology and Embryology.
6. Ocular and General Pathology.
7. Ophthalmic Lenses and Material.
8. Instruments.
9. Hygiene and Illumination.
10. Applied and Physical Optics.
11. Education, Sociology and Economics
12. Miscellaneous.

1. OCULAR REFRACTION

SCREENING TESTS AND THEIR EFFECT ON OPTOMETRY. J. Neumueller. Optical Journal and Review of Optometry. 1944, 81, 15, 18-19.

Neumueller believes that visual screening tests are a very poor substitute for a refraction and that their use should be limited to those occasions in which the screening is done under the direct supervision of a skilled refractionist. He particularly stresses the harm which may be done by a lay screener in refusing employment to a worker on the grounds that the worker has failed to pass the mechanical requirements of the screening instrument being used. Neumueller points out that all such tests in the hands of lay persons are unfair to the testee.

C.C.K.

NOTES ON THE FOCAL SYSTEM OF THE EYE. W. R. Coates. Refractionist. (London.) 1944, 32, September, 121-136.

Coates reviews a group of cases in which the ocular focusing system has a gross abnormality such as a corneal irregularity, lenticular striations and similar problems. He points out that many of these cases have dual focusing systems because of these defects and believes that subjective refractive procedures offer the best results in these difficult refractive cases.

C.C.K.

A NEW METHOD OF FITTING CONTACT LENSES. L. L. Beacher. Optical Journal and Review of Optometry. 1944, 81, 19, 23.

Beacher has developed a method of fitting the molded contact lenses without resorting to the use of an anesthetic. In brief his technique consists of first inserting a small corneal cover which rests upon the sclera immediately adjoining the cornea but not touching it either at its edges or at any point. The molds are then made in the usual manner. The technique is performed monocularly.

C.C.K.

OPHTHALMOMETRY. G. H. Aronsfeld. Optician. (London.) 1944, 107, 2782, 387-388.

Aronsfeld finds the ophthalmometer of great value in making ocular refractions. In fact, he suggests the instrument be used in all cases as an aid to other techniques. He cautions the user, however, that there are two factors which may interfere with the accuracy of the readings. These are (1) excess flow of tears, and (2) failure on the part of the patient to have his eyes wide open at the time the test is made, the pressure of the lids on the sclera and cornea resulting in improper readings. Both factors are easily overcome and do not detract from the many fine points of the instrument.

C.C.K.

DEFECTIVE NIGHT VISION AMONG SOLDIERS. I. C. Michaelson. British Journal of Ophthalmology. (London.) 1944, 28, 3, 140.

Michaelson investigated the reliability of Koch's dark adaptometer, the normal minimum for form and light perception on the instrument, the minimum form and light senses in subjects complaining of defective night vision and conclusions that might be drawn from these findings in helping to distinguish between psychogenic and organic night visual defect. The instrument is essentially a modified Hecht adaptometer. It is accurate in measuring minimum light and for senses. The normal minimum light and form senses vary but together afford sufficient if not a complete measure of the ability to see in the dark. Persons with defective night vision have a poor minimum form sense but many persons without defective night vision have also a poor mini-

mum form sense. Measurement of minimum light sense after three minutes dark adaptation in cases of defective night vision does not appear to have much diagnostic significance. Measurement of minimum form sense after thirty minutes dark adaptation of defective night vision does appear to be diagnostically useful. There are indications that in such cases a poor minimum light sense is associated with organic disturbance and a good minimum light sense with functional disturbance as the cause of the defective night vision. Dark adaptometers which measure the minimum form sense and not the minimum light sense have a limited usefulness for two reasons. First, there is a great variation in the minimum form sense among noncomplainers of defective night vision and, secondly, such instruments cannot help in the discrimination between physiogenic and psychogenic defective night vision.

T.O.B.

MODERN OPTOMETRY. M. T. Eberl. Visual Digest. 1944, 8, 2, 6-10.

Modern optometry in dealing with the function of vision, bases its postulates on those facts which are applicable to living functions and the pattern of human behavior as far as is known today. In the first place, says Eberl, the child learns to see in the same manner that he learns to crawl, walk and talk. As the learning progresses, the movements involved assume a characteristic pattern, made possible by the progressive organization of the nervous system. This is then called a behavior pattern. Finally, the child has learned all of the necessary adjustments of accommodation and convergence which enable him to see clearly and distinctly. Seeing involves learned relationships between accommodation and convergence. The visual analysis findings provide indexes of the efficacy of these learned relationships.

These relationships vary with each individual behavior pattern and, claims Eberl, are as characteristic of each individual as are his other learned behavior patterns. The lens that the patient appears to need is the measure of this learned relationship between the sensory motor arcs of accommodation and convergence. When the child or adult takes this learned relationship—his particular behavior pattern—to a new environment, as for instance, when he starts to read or when any new demand is made on vision, it follows out the general pattern of human behavior. When the equilibrium of a living organism is dis-

turbed, it makes, or attempts to make, some adequate adjustment to its environment. T.O.B.

EVOLUTION OF THE PLASTIC CONTACT LENS. T. E. Obrig. Optical World. 1944, 32, 10, 15-18.

The author reviews the early history of contact lens making and fitting and then outlines his method of prescribing the plastic contact lenses which bear his name. In this report the author presents his own review of his early experiences with fluorescin and blue light which now enables an optometrist to check the corneal fit of the contact lens in a way never before possible.

A.V.F.

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2. PHYSIOLOGICAL OPTICS AND COLOR VISION

THE NATURE OF THE SENSORY CORTEX. B. C. Hersch. Optometric Weekly. 1944, 35, 10, 263, and 1944, 35, 11, 291.

The author points out that there is no simple system of reception for the incoming sensory impulse from each of the topical areas for sensory stimulation. He further adds that a more effective understanding of the visual system will be obtained when it is fully understood that seeing begins in the brain and that perception is simply aroused by the image formed on the retina.

C.C.K.

PSEUDOISOCHROMATIC PLATE TEST OF COLOR VISION. R. E. Shoemaker. Archives of Ophthalmology. 1943, 29, 6, 909.

Under the supervision of the author 803 men were tested for impairment of color vision by means of the pseudoisochromatic plates for testing color perception. Of these, 93, or 11.4 per cent, were found to have deficient color vision, and 71 were further tested. Impairment of color vision as indicated by this test may be classified according to the number of errors as slight, moderate and severe. The incidence of these degrees of impairment was found to be: slight, 4.9 per cent; moderate, 1.6 per cent; severe, 4.9 per cent.

A.V.F.

CAUSES AND PREVENTION OF MYOPIA. H. H. Husted. Optometric Weekly. 1944, 35, 3, 67-69.

To the other more generally mentioned causes of myopia the author adds improper illumination, excessive near-point work and a lack of outdoor activity on the part of the patient.

C.C.K.

CONSIDERATIONS IN THE EVALUATION OF OCULAR FUNCTIONS. H. G. Martin. Eye, Ear, Nose and Throat Monthly. 1944, 23, 8, 305-307.

"The age period of beginning usefulness of accommodation, coordination, convergence, stereopsis, monocularly, and then binocularly with fusion, is pretty well established. When *integration* of all of these functions occurs is not so well established. It is well known that when a succeeding function enters into the picture, a modification of already existing functions undergo a rebalance, just as binocular functions modify the monocular by somewhat of a giving up process. The extent to which this readjustment enters is definitely an individual proposition. Human eyes make every attempt to conform to the demands made upon them and to the environment to which they are subjected. When later examination discloses incomplete response to any of these demands, we say the eyes do not meet 'normal' requirements. It is well to investigate the ocular fate of animal species which have given up the use of some of the structural parts resulting in dysfunction or complete loss through disuse, when environmental circumstances could not be met. At least it bears thought regarding human eyes especially since some attributes have been shown to have beginnings of use-neglect. Peripheral visual adjuncts to visual acuity, whatever the circumstance, have begun to show quite generally modification of potentiality through lack of use, the necessity having been largely removed. Ecology might serve to point the way to conservation of natural endowments to better general useful vision, whereby a *condition* is treated rather than the symptom. In short, the eyes have been made to conform to our environment, rather than modification of environment to suit the capabilities of the eye, conserving and enhancing its values."

T.O.B.

COLOR DISCRIMINATION IN INDUSTRY. B. R. Mason. Optometric Weekly. 1944, 35, 34, 933-940.

The author points out that color vision is more important in industry than generally recognized and that industry is beginning to become aware of this. He also claims that the number of persons who fail to pass color tests increases as the age level of the group tested advances. Mason suggests the term "color weak patients" for that group of persons who are not color blind but who lack the knowledge of color to pass present day color tests. He further suggests treatments for this group to improve their color consciousness.

C.C.K.

THE PHYSICAL AND PHOTOCHEMICAL BASIS OF VISUAL RESOLVING POWER. G. M. Byram. Journal of the Optical Society of America. 1944, 34, 10, 571-591.

For the past 15 years, the United States Forest Service has made investigations of the relation between atmospheric haze and the visual range of small forest fire smokes. It became apparent throughout the course of these investigations that although the visual range of a small body of smoke (or any other object of small angular diameter) was determined to a large extent by the scattering and absorption of light by the lower atmosphere, the nature of vision itself was equally important. It is not possible to derive equations for the visual range of a small object unless the relation between visual acuity and such factors as brightness, object-background contrast, and structure of the object are known. The answer to the question, "How far can an object of small angular diameter be seen through a hazy atmosphere?" will therefore depend on the solution of two problems:

(1) The determination of the effect of atmospheric haze on the contrast between a distant object and its background.

(2) The development of a general theory of visual acuity, and in particular the determination of the function relating visual acuity to the brightness contrast between a given test object and its background.

The first of these two problems has been considered in other publications, and the two parts of the present paper deal only with the second problem. This analysis was originally developed to apply primarily to the visibility of smoke bodies but has been generalized to

give a more comprehensive theory of visual acuity and photo-reception. The theoretical and experimental work is developed from a "blurred" image concept which is basically a diffraction theory of retinal image formation and when used in conjunction with a theory of photo-reception seems adequate for treating most problems of visual resolving power and the recognition of contour. The first part of this paper is primarily concerned with the distribution of illumination in the retinal images of small objects, and with visual acuity phenomena at high brightness levels. The second part deals with the more complex functions of the retina and with the photochemical aspects of visual acuity.

A.V.F.

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3. OCULAR MUSCLES

MUSCLE, FIBROUS AND NERVE TISSUE. T. R. Murroughs. Optical Journal and Review of Optometry. 1944, 81, 18, 22-23.

The author mentions the three forms of muscle tissue and reviews some of the known facts regarding each. He also outlines briefly the functions of fiber and connective tissue and reviews the action of the nerve fibers on muscles. He then points out that there still exists in some segments of optometry the thought that orthoptic training is prescribed to assist "weak muscles." He strongly points out that muscles are not weak and that orthoptic procedures are used, not to strengthen muscles but rather, to break down undesirable habits in the brain and build up a new set of patterns which will result in more effective vision.

C.C.K.

STRABISMUS AND ITS CORRECTION. O. B. Nugent. Eye, Ear. Nose and Throat Monthly. 1944, 23, 4.

Nugent opens with discussion of orthoptic treatment, recommending the affiliation with a technician to free the ophthalmologist for diagnosis and surgery. Then is decribed in detail the author's recessive operation, for which he cites the following advantages: (1) the operation is applicable to any form of ocular deviation in which a recession operation is indicated; (2) the eye can be readjusted on the second or third day after the muscles have recovered from the influence of the anaesthesia and the muscle tone is returned; (3) the technic is simple and uncomplicated; (4) no patch is placed over the eye, but the patient wears his glasses during convalescence; (5) the operation can be performed with the least amount of trauma; and (6) the results are good.

T.O.B.

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4. ORTHOPTICS AND READING

THE EFFECTIVITY OF VISUAL TRAINING. B. C. Hersch. Optometric Weekly. 1944, 35, 31, 863-864.

Orthoptic training sets up a series of cross radiations in the brain that at times influence many of the brain centers. This type of training, to be successful, must be performed with a high degree of attentiveness on the part of the patient if the treatments are to be of value. The author presents several case reports indicating the need for active cooperation on the part of the patient.

A.V.F.

CURES? G. O. Ohlsson. Michigan Optometrist. 1944, 23, 8, 3.

The author has watched some optometrists attempt to correct any and all visual problems by means of orthoptic techniques. He is not pleased with their attitude. Ohlsson has observed these optometrists in their work of treating candidates desirous of passing the visual tests required by the armed services and he feels that care should be exercised in statements as to what will or may be accomplished by orthoptics. He points out that genuine eye defects are not changed by any known orthoptic treatment and points out also that in myopes of low degree that while it may be possible to improve visual acuity, the patients may have been over-corrected in the first place and high exophorias may have been a contributing factor. Ohlsson quotes Dr. R. E. Bannon, optometrist, on the staff of the Dartmouth Eye Clinic, who said, "Much too often myopic patients are given false hopes about seeing normally without glasses and these unfortunate occurrences bring much discredit to the profession." Paraphrasing this statement Ohlsson adds that other promises in heterophoric and strabismic cases do likewise. To ape the "throw away your glasses" cults is not an advance and he notes that even Dr. Skeffington recently said a good word for glasses, so perhaps there is hope that we can get back to earth, instead of trying to use a "flying carpet" to carry us along through the clouds of fog built up by the mouthings of those, who, perhaps sincere, are not too well versed in what they talk about.

C.C.K.

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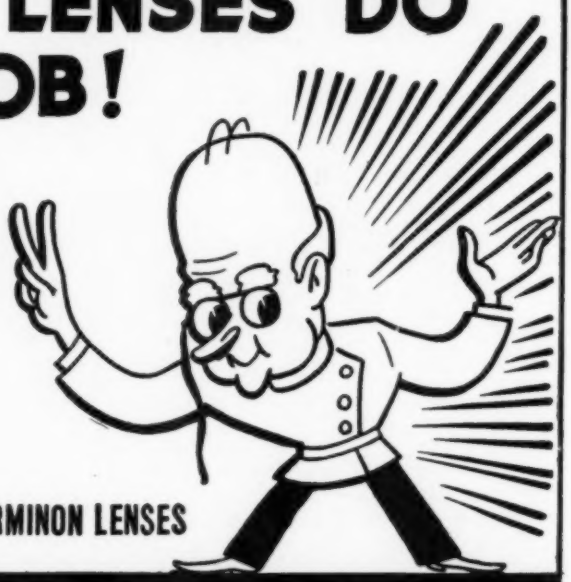

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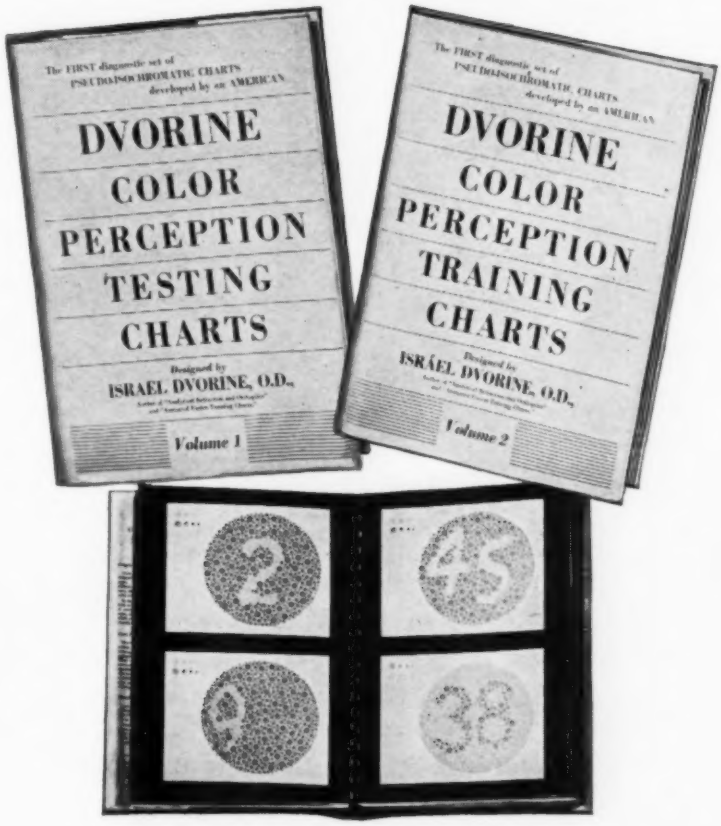

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